Project Deliverable C1: **Conceptual Design, Project Plan, and Feasibility Study**

GNG 2101

Faculty of Engineering - University of Ottawa

Present to :

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For the course :

Introduction to Product Development and Management For Engineers

GNG 2101

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Part C.1 Concept Design

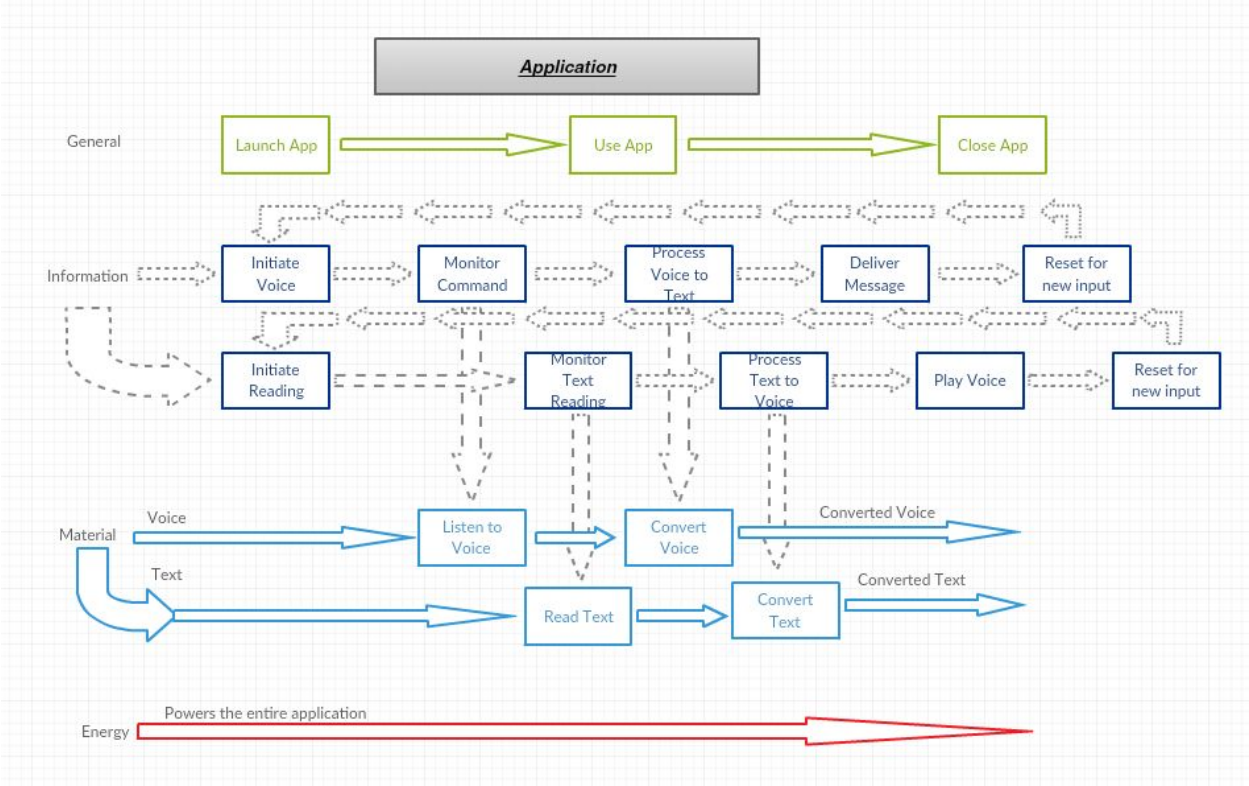
Introduction

In this deliverable we refine the design of our product by creating a variety of different concepts to solve various problems that our client faces, and then choosing the ones that we feel will remedy the most important issues in the best manner.

We then revised our early version of our project plan and have made many notable changes, such as splitting up vague tasks into more specific parts and assigning them to members, creating new tasks that fit our new design and concepts, adjusting the time frames of our tasks, and have added in milestones to use as gauges for our progress and smaller goals to work towards. Our plan has been brought in-line with our design, and our path moving forward, as well as the complete path towards our finished product is now much clearer.

Finally, we have discussed the various uncertainties and risks with our product design and plans. Various circumstances were taken into consideration, such as the cost for peripherals, the U.I. size due to our client still retaining a certain amount of sight, and more software related risks such as client data security, and ruining a phone due to faulty coding that accesses many administrator levels.

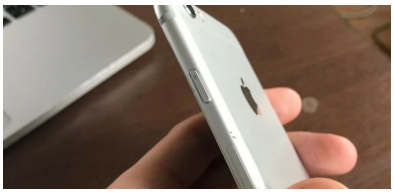
Functional Decomposition

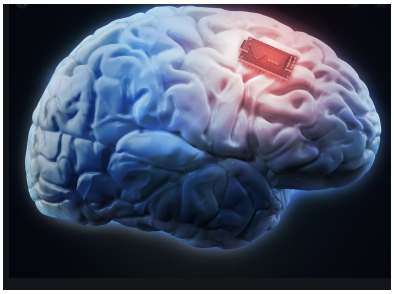


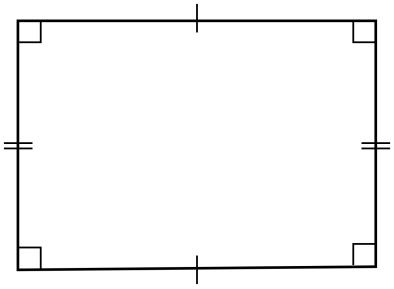
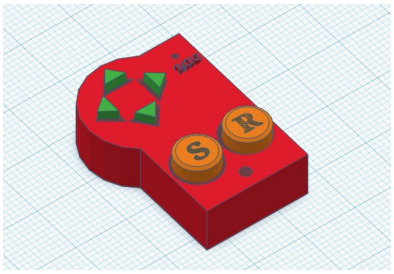
This functional decomposition chart shows the core functionality and important functions related to our product. The key functionality of this application is to be able to convert text to speech and speech to text in order to aid visually impaired individuals use their electronic device(s). The general flow of the application begins with the launch of the app. The user will then select whether they would like to use the text-to-speech functionality or the speech-to-text functionality. If the user chooses the speech-to-text option, the app initiates the voice reading and monitors the speech from beginning to end in order to obtain the full desired input. The app then passes the voice input through a process in order for it to convert to text so the user may send that text in a message to someone else, use that text in a document, etc. The information then gets reset after the procedure is completed in order to await a new input, if any. The main material for this portion is the voice, as it is the voice that gets passed through the entire process. The voice gets inputted to the app when the command gets monitored. Then, the voice goes through the conversion process and gets outputted as text. On the other hand, if the user chooses the text-to-speech functionality, the app initiates the text reading and monitors the designated text from beginning to end in order to obtain the full desired input. The app then passes the text through a process in order for it to convert to voice, so the user is able to hear what the text reads. The information then gets reset after the cycle is complete in order to await a new input, if any. The main material for this portion is the text, as it is the text that gets passed through the entire process. The text gets inputted to the app as the text reading gets monitored. Then, the text goes through the conversion process and gets outputted as speech. The energy required for this app is electricity, as this app requires electricity to power the device, and the device to run the application.

Concept Designs

In this section team members will introduce their concepts on the given product

Concept Creator	Design Concept	Image if applicable
Cadence	Triple click power button to activate the app, voice immediately asks the user if they would like text-to-speech or speech-to-text, etc.	
	Voice activation to trigger the app on and off. For example, by saying “[name of app] on”, the app will activate. And by saying “[name of app] off”, the app will shut down. Can be compared to “Hey Siri!” on iOS platforms.	
	Uses voice recognition to identify desired tasks. For example, the user can say “read this text” and the app will read the text on the screen to	

	the user.	
Cian	Chip implant. Will allow the user to control their device by thought. This concept is physical and may take a toll on the user if implanted incorrectly.Advantages quick access, ease of access once installed, and language setting is universal because it accesses thought.	
	Plug in controller. Use an already created controller with binding key options where we can bind all the needed functions such as switch language, select text, screen read,ect on a easy to use controller	
	Robot butler.We will create a butler able to understand vocal commands and act accordingly to the commands given such as switch app, change language and read text.	
Kevin	Able to use siri to turn software on and off. Can activate reading by voice command or by a physical gesture such as tapping on an area 3 times.	
	Use a bluetooth keyboard to activate certain keybinds	
	For more specific reading, user can take screenshots and use the finger to circle areas of interest.	

Ralf	Moveable button to active voice commands on iphone. Like an overlay on the iPhone/Computer that you can use at any time	
	2 way wireless connector for iPhone to PC. Able to mirror one device onto the other, allowing usage of voice commands on devices that the software is not native to.	
	Moveable rectangle selector. Move it to surround the text you want to read out loud. Can also scan images as well, which the software then attempts to convert into audio to read out loud	
Valerie	This concept is a physical bluetooth remote that the user can use to trigger the app. By doing this it allows the user to interact with the application in an easier way. This remote includes a button for reading text, for sendinging messages, navigational buttons and includes a microphone to speak into.	
	Like the screen home button that already appears in the OS the app that we possibly create can be on the screen at all times for easy access.	

	Maybe just make a keyboard application that the user can activate, which features a text to speech option even on items that don't already have this feature.	

Concept Analysis and Evaluation

Due to the nature of our product being one for someone who is visually impaired, some of our design concepts do not have sketches since they have no visual components. For each component that did possess a visual component, some have included real world objects such as video game controllers. This is due to our client's statements on preferred peripherals to include, and as such we did not create the sketches of them ourselves.

The highlighted concepts have been selected to be the concept features we plan to implement, or prioritize more out of the rest. Group discussions have helped us select these features due to the problem our client faces, and the best ways we have reasoned to solve them.

As our client is visually impaired, all of the selected concepts require very little visual attention to use correctly. Controlling the software with voice commands was a big part of our client's statements, and alongside this was text not being read out loud to him in other apps.

The two selector concepts we have highlighted solve the problem of messaging apps not reading messages out-loud, while the voice command activation concepts suit the particular needs of our client.

The button activation floating on the homescreen of the device was discussed due risks of our client not being able to see it clearly, but this bit is a secondary access method, and should be placed in the same position generally so that it is more muscle memory.

Lastly, the external game controller is our feature that we placed the least priority on, but we have decided that we do place some importance on it due to our client's statements. We plan to implement the features mentioned before first, and plan to work on a controller add-on to use on various devices after.

The concepts that we did not select had various problems that prevented us from choosing them. Some, like a triple-click to activate button, overlapped with other concepts that we felt were better suited to our client. The rest were either too risky, not feasible to create with our skills, or could be solved with other concepts, such as the 2-way wireless connector being better solved with a peripheral controller.

Group Concept

Our final design revolves around a text-audio software that is able to be controlled primarily with voice commands, with some added functionality on screen of the device to help our user maneuver the app more precisely. A small overlay button will allow for the user to select the area of the screen they would like translated to audio more precisely, while regular voice commands will allow navigation of the phone, and the entire screen to be read through certain audio lines. An extra gaming controller peripheral will help in translation selection on other devices, such as a personal computer.

With voice commands as the main way of using the app, it becomes very easy for our target audience (those with visual impairments) to use the app, which reduces the complexity to learn it.

Most of the constraints will be met due to the simplicity of the software U.I.

The various visual aesthetics of the app are also met with our design, as the simple UI will allow for large text if needed, and bright, easy to see color schemes.

Part C.3 Feasibility Study

Uncertainties/Risks: There should not be many risks that could happen from this project, but the only “risk” that could come up is the problem of client data security. Since we are building a software that will be accessing all aspects of a user’s mobile device, personal data could be shown to the screen reader. To best solve this risk, we will make sure our application does not

store any information accessed. There are certainly some uncertainties heading into the project as well. The main uncertainty relates to how we can get our app to run in the background or on top of the Apple operating system (iOS). We understand that iOS is fairly tough to manipulate. This problem will be discussed further with the TELOS factors.

Technical: Our main area of uncertainty would be the technical feasibility of the project. Throughout the semester, we hope to be able to learn all of the expertise needed to build a screen reader for iOS. The issue that concerns us the most is due the complex nature of a screen reader. It is not an application where a user can simply open the app, do things **inside** the app then close it. Our screen reader has to somehow run in the background alongside all aspects of the device. As none of the team members have much experience working with iOS applications, this whole situation will certainly require much more research from the team and hopefully we can learn about how this problem can be solved. Otherwise, an alternative solution will have to be created.

Economic: This project is certainly affordable as we are mainly using software to implement to application. If we eventually decide to add external hardware to go with the application, the cost of making a controller should not be too concerning. Most likely if we are to use external hardware, it would be for example, a pre-built controller which is not very expensive.

Legal: Possible legal issues could stem from data security. We plan to make sure our application never stores any data from the user's mobile device. Our application should simply read out what is selected and erase any data collected instantly. The app should not store anything it has read or received from voice input.

Operational: We are using many organization methods to help make sure we can complete our project on time. These methods include our gantt chart for organized scheduling as well as meetings to discuss and work on our weekly deliverables.

Scheduling: Our final prototype is expected to be completed by December 3rd, 2020. As long as we mostly stay on schedule with our deliverables, this should be a reasonable deadline. If we experience exceptional delays on certain areas of the project we can certainly scale down our features to the most important for our client. We should be working towards a project with the most important features thoroughly tested instead of many features with little testing.

Conclusion

To conclude, our group has made many important decisions regarding our product, which all affect our overall plan and the future prospects of our product. As a group, we all came up with various concept features for our design, and have selected the best and most feasible ones to include in our product. We then reworked our initial project plan to accommodate for the newly chosen design features, and have gone into more detail for each step of the project. Finally, we

have determined the risks associated with our overall design and how we will go about testing our product now that our plan is more refined.